

REMARKS/ARGUMENTS

The present amendment is in response to the Office Action dated July 31, 2009. A one month extension of time and a Declaration Under 37 C.F.R. § 1.132 are filed herewith. Claims 1-24 are pending in the present application.

Claim Rejections under 35 U.S.C. § 102(b) and § 103(a)

The Examiner rejected Claims 1-5, 7-17 and 19-24, under 35 U.S.C. § 102(b), as anticipated by, or, in the alternative, as obvious over, U.S. Patent 5,811,379 (hereinafter the '379 patent), alone, or, alternatively, as evidenced by U.S. Patent 4,704,491 (hereinafter the '491 patent). Applicants respectfully traverse for the following reasons.

The '379 patent does not teach or suggest the invention as claimed. On page 3 of the present office action, the Examiner has asserted that the '379 patent discloses a catalyst suitable for the polymerization process discussed in Applicants' claimed invention, which is taught by "Stevens at al." in US Patent 5,132,380 (hereinafter the '380 patent). However, the '379 patent clearly desires "late transition metal catalyst systems," and the effective catalyst systems disclosed in the '380 patent are not "late transition metal catalysts," required by the '379 patent. As noted in the Declaration by Dr. Kolthammer, one skilled in the art would recognize that the paragraph on column 9, lines 13-24 of the '379 patent, was included for the "method of preparation of the ionic catalysts using non-coordinating anion complexes," disclosed in the cited art, and not for the particular transition metal components of the disclosed catalysts, which the '379 patent refers to as "transition metal cation (based on metallocenes)." The '379 patent clearly teaches that these references teach a preferred method of preparation, wherein the metallocenes are protonated by an anion precursor, such that an alkyl/hydride group is abstracted from a transition metal, to make it both cationic and charged balanced by the noncoordinating anion, and that these teachings may be useful to those skilled in the art for the late transition metal catalysts of the '379 invention (see column 9, lines 18-24). Thus, "the preferred method of preparation" is what is of interest for the "late transition metal catalysts" of the '379 patent. In addition, the '379 patent teaches away from the metallocene and Ziegler-Natta catalyst

systems of the prior art. For example, as noted in the Declaration by Dr. Kolthammer, the '379 patent teaches the following: 1) metallocene and Ziegler-Natta catalyst systems are more sensitive to impurities and catalyst poisons (see column 4, lines 5-12, and column 10, lines 57-61); 2) metallocene and Ziegler-Natta catalyst systems produce polymers whose short chain branch length is singular (that is, the chain branch is determined by the monomer polymerized into polymer backbone), as opposed to a distribution of branch lengths resulting from the polymerization of each monomer or a combination of monomers (see column 20, lines 38-50); and 3) polymers produced using metallocene catalyst systems result in terminally unsaturated polymers with a high concentration of vinylidene type unsaturation relative to vinyl type unsaturation (thus, as implied by the '379 patent, would lead to lower "active ingredient concentrations" of the dispersant additives produced therefrom (see column 3, line 66 to column 4, line 4; column 18, line 60 to column 19, line 2; and column 19, lines 25-42)).

The '379 patent describes the polymerization of olefins using "late transition metal catalyst systems," of the formula "LMX_r," where M is a group 9, 10 or 11 metal (see, for example, column 5, lines 31-36). The '379 patent desires to produce polymers derived from one or more olefins, and which have the following features: (1) an average ethylene sequence length (ESL) from about 1.0 to less than about 3.0, (2) at least about 50% of the branches being methyl and/or ethyl branches, and other properties, as noted, for example, in the abstract of the '379 patent. As discussed in the Declaration, these properties are derived from the polymerization behavior of the "late transition metal catalyst system," a key feature of the '379 patent. As discussed in the Declaration, if a late transition metal is not used in the complexes described in the '379 patent, features (1) and (2) above would not be produced, because such complexes (with an earlier transition metal) would not show "chain straightening behavior (see column 22, lines 15-20 of the '379 patent)," and thus would produce polymers with longer ethylene sequence lengths in a copolymerization where ethylene is present, or an ethylene sequence of zero in a polymerization where no ethylene is present; and would produce polymers with higher levels of vinylidene termination

(see column 3, line 66 to column 4, line 4; column 18, line 60 to column 19, line 2; and column 19, lines 25-42).

Also, as discussed in the Declaration, the homogeneous substantially linear, liquid, or gel-like, low molecular weight ethylene/alpha-olefin polymers, as claimed, are produced by copolymerizing ethylene with a higher alpha-olefin. The claimed polymers each contains a longer ethylene sequence length (ESL greater than 3), and consists of 100% of its short chain branches defined by the side chain of the alpha-olefin comonomer (for example, for an octene comonomer, every side chain is a hexyl branch). The late transition metal catalysts disclosed in the '379 patent will not produce the homogeneous substantially linear, liquid, or gel-like, low molecular weight ethylene/alpha-olefin polymers, as claimed. As discussed in the Declaration, the catalysts of the '379 patent show poor copolymerization behavior with respect to the reactivity of alpha-olefins, compared to the reactivity of ethylene. In the presence of ethylene, the '379 catalysts will not incorporate an alpha-olefin to the extent required to form a liquid, or gel-like, ethylene/alpha-olefin polymer (each containing high amounts of the alpha-olefin, sufficient to achieve the respective liquid or gel-like form).

The '380 patent discloses certain ionic catalysts having the general formula " $\text{CpMX}_n^+\text{A}^-$ " (see, for example, column 1, lines 41-65). As discussed in the Declaration, none of the actual transition metal complexes described in the '380 patent (see column 3, line 64 to column 4, line 30), contain a late transition metal. As discussed in the Declaration, if M is chosen from the late transition metals, an inactive olefin polymerization catalyst system would result, and/or a catalyst system with a poor reactivity for higher alpha-olefins, relative to ethylene, would result. In addition, as discussed in the Declaration, these catalyst systems would not show "chain straightening behavior," a key feature of the "late transition metal catalyst systems" of the '379 patent (see column 22, lines 15-20 of the '379 patent). As discussed in the Declaration, if these '380 catalyst systems (with M chosen from the late transition metals) were used in the polymerization processes of the '379 patent, these catalyst systems would not readily incorporate a higher alpha-olefin, while polymerizing

ethylene, and would not produce a liquid, or gel-like, low molecular weight ethylene/alpha-olefin polymer, as claimed in the present application.

For at least the above reasons, the '379 patent does not teach or suggest the invention as claimed. The '491 patent does not overcome the deficiencies of the '379 patent. Thus, the '379 patent, as evidence by the '491 patent, does not teach or suggest the invention as claimed. Applicants request the withdrawal of this rejection.

The Examiner rejected Claims 6 and 18, under 35 U.S.C. § 102(b), as anticipated by the '379 patent, alone, or as further evidence by the '491 patent and Wittcoff et al., *Industrial Organic Chemical*, 2nd edition, 2004 (hereinafter the *Wittcoff* reference). Applicants respectfully traverse for the following reasons.

As discussed above, the '379 patent does not teach or suggest "homogeneous substantially linear, liquid, low molecular weight ethylene/alpha-olefin polymers" as claimed, or "homogeneous substantially linear, gel-like, low molecular weight ethylene/alpha-olefin polymers" as claimed. Neither the '491 patent nor the *Wittcoff* reference overcome the deficiencies of the '379 patent. Applicants request the withdrawal of this rejection.

Applicants respectfully submit that the present amendment is now in condition for allowance. If further issues remain, Applicants respectfully request that the Examiner call Applicants' undersigned representative.

Respectfully submitted,

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